

RDMS DocID 00100198

**DOCUMENTATION OF  
ENVIRONMENTAL INDICATOR  
DETERMINATION (CA750)  
MIGRATION OF CONTAMINATED  
GROUNDWATER UNDER CONTROL**

**RCRA RECORDS CENTER**  
FACILITY MAC DERMID  
I.D. NO. CTD 001164599  
FILE LOC. R-13  
OTHER RD MS# 100198

**MacDermid, Incorporated  
526 Huntingdon Avenue  
Waterbury, Connecticut**

**November 2002**

**Prepared for**

**MACDERMID, INCORPORATED  
245 Freight Street  
Waterbury, CT 06702**

**Prepared by**

**LOUREIRO ENGINEERING ASSOCIATES, INC.  
100 Northwest Drive  
Plainville, Connecticut**

*An Employee Owned Company*

**Comm. No. 91MH204.003**



Loureiro Engineering Associates, Inc.

## TRANSMITTAL

TO: United States Environmental Protection Agency One Congress Street, Suite 1100 Boston, MA 02114-2023 ATTN: Ms. Carolyn Casey	DATE: November 22, 2002 PROJECT: MacDermid VCAP LOCATION: Waterbury, CT COMM. NO.: 91MH204.003 PHONE #: 617-918-1368
---	--

We are sending you ☒ Herewith ☐ Delivered by Hand ☐ Under Separate Cover via \_\_\_\_\_

The following items:

☐ Plans ☐ Prints ☐ Shop Drawings ☐ Specifications  
☒ Reports ☐ Copy of Letter ☐ \_\_\_\_\_

COPIES	DATE OR NO.	DESCRIPTION
1	November 2002	Documentation of Environmental Indicator Determination (CA750) - Migration of Contaminated Groundwater Under Control
1	November 2002	Documentation of Environmental Indicator Determination (CA725) - Current Human Exposures Under Control
1	November 22, 2002	Conceptual Site Model and Work Plan Response Letter

### THESE ARE TRANSMITTED AS INDICATED BELOW

☐ For your use ☐ No Exceptions Taken ☐ Return \_\_\_\_\_ Corrected Prints  
☐ For Approval ☐ Make Corrections Noted ☐ Submit \_\_\_\_\_ Copies for \_\_\_\_\_  
☒ As Requested ☐ Amend and Resubmit ☐ Resubmit \_\_\_\_\_ Copies for \_\_\_\_\_  
☐ For Review & Comment ☐ Rejected ☐ For Bids Due  
☐ \_\_\_\_\_ ☐ Returned after Loan to us

### REMARKS:

CC: Mr. Troy Charlton, MacDermid, Incorporated  
Mr. Richard Nave, MacDermid, Incorporated

BY: \_\_\_\_\_

---

## ATTACHMENTS

Attachment 1	Figures
Attachment 2	Drawings
Attachment 3	Tables



**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 1**

**DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**

Interim Final 2/5/99

**RCRA Corrective Action**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Migration of Contaminated Groundwater Under Control**

**Facility Name:** MacDermid Incorporated  
**Facility Address:** 526 Huntingdon Avenue, Waterbury, Connecticut  
**Facility EPA ID #:** CTD001164599

1. Has all available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

  X   If yes - check here and continue with #2 below.

       If no - re-evaluate existing data, or

       if data are not available, skip to #8 and enter "IN" (more information needed) status code.

**\*Note:** According to a February 11, 2002 correspondence from the United States Environmental Protection Agency (EPA), groundwater monitoring was performed 8/87, 1/88, 10/88, 10/92, 2/93 and twice in 1/94; data from these events were not available for review and was not used in development of this EI.

**BACKGROUND**

**Definition of Environmental Indicators (for the RCRA Corrective Action)**

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

**Definition of "Migration of Contaminated Groundwater Under Control" EI**

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., Site-wide)).

**Relationship of EI to Final Remedies**

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

**Duration / Applicability of EI Determinations**

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 2**

2. Is **groundwater** known or reasonably suspected to be “contaminated”<sup>1</sup> above appropriately protective “levels” (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

- X   If yes - continue after identifying key contaminants, citing appropriate “levels,” and referencing supporting documentation.
- If no - skip to #8 and enter “YE” status code, after citing appropriate “levels,” and referencing supporting documentation to demonstrate that groundwater is not “contaminated.”
- If unknown - skip to #8 and enter “IN” status code.

**Rationale and Reference(s):**

The Site is located at 526 Huntingdon Avenue in Waterbury, Connecticut (Figure 1 in Attachment 1) and includes two parcels of land (i.e. the NORTH parcel and the SOUTH parcel). The first parcel is located on the southern side of Huntingdon Avenue and encompasses approximately 11 acres. For the purposes of clarity in this document, the 11-acre parcel will be referred to as the SOUTH parcel. The SOUTH parcel is improved with three interconnected buildings with a total footprint of approximately 182,500 square feet. These buildings are referred to as the Gear Street Building, East Aurora Street Building, and the Huntingdon Avenue Building. There is little topographic relief on the SOUTH portion of the Site, which lies at approximately 300 feet above mean sea level (MSL). The Site is located approximately 1,000 feet northwest of the Naugatuck River, which lies at approximately 260 feet above MSL. The Site and immediately surrounding area are zoned for industrial use.

The second parcel is located on the northern side of Huntingdon Avenue, and encompasses approximately 30 acres. For the purpose of clarity in this document, the 30-acre parcel will be referred to as the NORTH parcel. The NORTH parcel is primarily covered with grass and other native vegetation. Two paved areas are located on the southern and southeastern portions of the NORTH parcel. The first paved area is located immediately along the north side of Huntingdon Avenue and was used for parking by employees of the MacDermid facility located on the southern side of Huntingdon Avenue. The second paved area, located approximately 400-feet north of Huntingdon Avenue, serves as an asphalt cap to a sludge disposal area. Historical information pertaining to the sludge disposal area is presented later in the text of this section.

The MacDermid facility was primarily engaged in blending and/or compounding chemical materials used in the metal finishing, plating on plastics and printed circuit industries. In particular, MacDermid manufactured inks and electroless nickel plating solutions for these industries. The Standard Industrial Classification (SIC) Code for the facility is 2899. Ancillary activities conducted by MacDermid at the facility included reprocessing copper etchant solution received in bulk from their customers or off-site MacDermid facilities.

In order to determine a general history of the Site, Sanborn Fire Insurance Maps and aerial photographs pertaining to the Site were reviewed. The Sanborn Fire Insurance Maps obtained from the Connecticut State Library archives indicated that the Waterbury Steel Ball Company occupied the Gear Street Building and the Carroll Wire Company occupied the Huntingdon Avenue Building in 1921. Mapping prior to 1921 was not available. Also, the Sanborn Map indicated that MacDermid occupied the Huntingdon Avenue Facility in 1930. Aerial photographs of the Site obtained from the DEP depict a drum storage area of approximately 30 drums behind a shed outside the Huntingdon Avenue Building in the 1965 photograph

**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 3**

that did not appear in the 1970 photograph. Aerial photographs also indicate a lagoon was added between 1970 and 1975 west of the Huntingdon Avenue Building near Huntingdon Avenue. This lagoon and a second adjacent lagoon were used for disposal of organic and inorganic process waste generated at the facility by MacDermid. The lagoons were removed between approximately 1980 and 1986 and the East Aurora Street Building was constructed such that the Huntingdon Avenue Building was connected to the Gear Street Building. The Site remained generally unchanged from 1986 to 2002.

According to historical environmental investigation reports, between 1978 and 1979, approximately 1,000-cubic yards of metal hydroxide sludge was removed from the aforementioned waste lagoons and disposed of in an excavated area on the southeastern portion of the MacDermid NORTH parcel located on the northern side of Huntingdon Avenue. In addition to metal hydroxide sludge, potentially-contaminated soil from the MacDermid property south of Huntingdon Avenue was reportedly also disposed of in the same excavated area. The specific origin of the potentially-contaminated soil is unknown. Prior to emplacement on the MacDermid NORTH parcel, the waste materials were mixed with Site sand and gravel to increase load-bearing characteristics. In 1986, the material was covered with approximately nine inches of processed aggregate and three inches of asphalt.

In 2002, manufacturing activities at the facility ceased. At the time of this submittal, MacDermid conducts only office activities in the Huntingdon Avenue Building and shipping/receiving of raw product (from other MacDermid facilities) in the East Aurora Street Building. With the exception of shipping and receiving, all product and waste materials have been removed from the facility.

A report entitled *Conceptual Site Model (CSM) and Screening Levels, MacDermid Incorporated* was prepared in May 2002 by LEA. EPA comments to the CSM have been addressed in the cover letter included with this environmental indicator determination. The CSM provides a description of exposure media and exposure pathways, a description of potential receptors, a rationale and approach to screening analytical data generated for exposure media, and screening levels for exposure media. For the facility, the model also identifies the applicable receptors, exposure media and pathways that require screening as shown on Drawing 1 through Drawing 3 in Attachment 2 and depicted graphically on Figure 2 in Attachment 1.

A Site plan for the MacDermid facility that also depicts groundwater sampling locations and a complete listing of constituents detected in groundwater is provided as Drawing 1 in Attachment 2. Drawing 2 depicts Site features, groundwater sampling locations and an interpretation of groundwater flow direction. Site geology has been evaluated during the course of investigation activities completed at the Site by Loureiro Engineering Associates, Inc. (LEA) and others. The unconsolidated deposits beneath the Site generally consist of gray brown and brown, fine to coarse sand with traces of gravel. A fill layer consisting of medium to coarse sand and building debris was identified in some boring locations to depths of approximately five feet below grade. Groundwater flow direction beneath the Site in the unconsolidated deposits is generally from north to south in the direction of the Naugatuck River. Based on an evaluation of depth to groundwater and topographic relief change between the Site and the Naugatuck River, it is likely that groundwater beneath the Site discharges to the Naugatuck River. With the addition of two groundwater monitoring wells to the southeastern Site boundary in August 2002, the groundwater monitoring well network at the Site is determined to be adequate in number and spatial distribution to assess the quality of groundwater at the Site.

**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 4**

Groundwater samples have been collected from the thirteen monitoring wells on Site. The location of each well is shown on Drawing 1 in Attachment 2. The initial sampling was conducted in March 1995 and sampling was subsequently conducted in February 2001 and July 2002.

During the 1995 sampling event, groundwater was analyzed for metals (arsenic, cadmium, copper, lead, mercury, selenium, silver, and zinc), volatile organic compounds (VOCs), total cyanide, amenable cyanide and fluoride. Total petroleum hydrocarbons (TPH) were added to the analytical suite in the 2001 sampling event. During the 2002 sampling event, groundwater samples were analyzed for metals (arsenic, barium, cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, tin, and zinc), VOCs, total cyanide, and extractable total petroleum hydrocarbons (ETPH).

Samples were collected from monitoring well MW-108 in 1995 and 2001. During the 2002 sampling event, floating product was observed in this well and no samples were collected. The product was purged from the well with a bailer so that only a sheen remained on top of the water column. Subsequently on August 28, September 3, and September 5, 2002, the product thickness was recorded and was then purged from the well so that only a sheen remained. Product thickness was recorded on August 28 at 0.5 feet, on September 3 at 0.1 feet, and as only a sheen on September 5, 2002.

To address potential impacts to surface water, the groundwater sampling data was compared to the Surface Water Protection Criteria (SWPC) listed in the Connecticut Remediation Standard Regulations (RSR). During the 2002 sampling round, groundwater from a total of four monitoring wells contained constituents or compounds that exceed the SWPC. These constituents/compounds include: arsenic, cadmium, copper, lead, mercury, nickel, silver, zinc, 1,1-dichloroethylene, and tetrachloroethylene. The concentrations were similar or less than previously detected in wells during 1995 and 2001 sampling events. Exceedances of the SWPC noted in groundwater samples collected during the 1995 and 2001 sampling events include: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc, cyanide, and tetrachloroethylene. A summary of exceedances to the SWPC are presented on Drawing 1 in Attachment 2 and Table 1 in Attachment 3.

To address potential exposures to Environmental Samplers from contact with groundwater while collecting samples at the Site, the groundwater data collected from the MacDermid facility were compared to the Federal Maximum Contaminant Levels (MCL). Exceedances of the MCL identified for the most recent sampling round include: nickel, 1,1-dichloroethylene, 1,2-dichloroethane, tetrachloroethylene, and trichloroethylene. The concentrations were similar or less than previously detected in wells during the 2001 sampling events. Exceedances of the MCL noted in groundwater samples collected during the 2001 sampling event include: cadmium, chromium, nickel and tetrachloroethylene. Table 2, provided in Attachment 3 to this EID, includes a summary of exceedances of the MCL for groundwater collected at the Site. The data is also summarized on Drawing 1.

The potential for exposure to off-site residents by indoor air impacted by volatile organic compounds in groundwater was indeterminate at the time of the submittal of the *Conceptual Site Model and Screening Levels, MacDermid Incorporated* in May 2002, due to the lack of data to verify groundwater flow direction, depth to groundwater, and potential for volatilization of contaminants from Site groundwater. For the purpose of the Qualitative Risk Assessment screening, groundwater quality data collected from on-site monitoring wells in July 2002 that are nearest abutting residential properties were compared to the Connecticut RSR Residential Volatilization Criteria (RVC) to provide an evaluation of potential risk to off-site receptors (i.e. residence), although these risks are minimized due to the significant depth to

**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 5**

groundwater at the Site (i.e. ~30 feet below grade on the SOUTH parcel) and the direction of groundwater flow south toward the Naugatuck River). The data was also compared to the Industrial/Commercial Volatilization Criteria (IVC) in order to assess the potential exposure to workers inside Site buildings. Potential exposure pathways under this condition would involve volatilization of contaminants from impacted groundwater into the vadose zone, migration through the soil column into indoor air space and inhalation by the receptor.

VOCs were detected in 2002 at concentrations that exceed the regulatory criteria. Specifically, concentrations of 1,2-dichloroethane and 1,1-dichloroethylene exceed the RVC at well MW-111 and exceeded the RVC and the IVC in well MW-115.

From a review of groundwater analytical data collected in July and September 2002, combined with the fact that groundwater flow beneath the Site is southerly toward the Naugatuck River, it is concluded that contaminated groundwater at the Site does not have the potential to impact abutting residential properties to the southwest. Groundwater contours developed during the September 2002 sampling event which support this conclusion are depicted on the site plan included as Drawing 2 in Attachment 2.

**Footnotes:**

i "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).



**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 6**

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"<sup>2</sup> as defined by the monitoring locations designated at the time of this determination)?

- X   If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"<sup>2</sup>.
- \_\_\_\_\_ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"<sup>2</sup>) - skip to #8 and enter "NO" status code, after providing an explanation.
- \_\_\_\_\_ If unknown - skip to #8 and enter "IN" status code.

**Rationale and Reference(s):**

As discussed in Question 1 above, groundwater at the Site is contaminated with metals and VOCs that exceed the SWPC and the MCL, and VOCs that exceeded the RVC and the IVC for select constituents.

In the 2002 sampling event, no constituents were detected at concentrations exceeding the applicable criteria in well MW-113, located on the southwestern corner of the Site near East Aurora Street, or MW-105, which is located to the east of the Site building. In the three sampling events conducted at the site in 1995, 2001, and 2002, constituents detected in MW-105 include low concentrations of metals barium, chromium, copper, nickel, and zinc and VOCs acetone, chloroform, methylene chloride, tetrachloroethylene, and trichlorofluoromethane. Constituents detected in MW-113 include barium, cadmium, nickel, selenium and zinc and VOCs including acetone, isopropylbenzene, tert-butylbenzene, sec-butylbenzene, and cymene. The concentration of zinc in MW-113 (0.16 mg/l) exceeded the SWPC of 0.123 mg/l in the July 2001 sampling event. However, in 2002, the concentration of zinc detected in this well (0.029 mg/l) was below the SWPC. Based upon the results from the 2002 sampling event, the groundwater contamination plume does not appear to be growing in size and is constrained between wells MW-105 and MW-113 as the eastern and western limits of the plume.

As downgradient wells MW-111, MW-113, MW-114, and MW-115 generally represent the quality of groundwater as it discharges from the Site, sampling data from 2002 for these wells was reviewed in order to determine whether the groundwater contamination appears to be migrating beyond the downgradient boundaries of the Site.

A review of groundwater analytical data indicated that metals including arsenic, copper, lead, and zinc were detected at concentrations that exceeded the SWPC in downgradient well MW-115 during the July 2002 sampling event. VOCs including 1,1-dichloroethylene (11DCE), 1,2-dichloroethane (12DCA), tetrachloroethylene (PCE), and trichloroethylene (TCE) were detected at concentrations that exceeded the SWPC, the RVC and/or the IVC in wells MW-111 and MW-115. These concentrations of 11DCE, 12DCA, PCE, and TCE that were detected above the applicable criteria in monitoring wells MW-111 and MW-115, as well as upgradient well MW-110, have increased over time. Specifically, the concentration of 12DCA in MW-111 has increased from 4.0 micrograms per liter (µg/l) in 1995 to 17 µg/l in 2001 and to 84 µg/l in 2002. Similarly, 11DCE was not detected in MW-111 in 1995, but increased to 0.5 µg/l in 2001 and 2.0 µg/l in 2002. TCE, PCE, 12DCA, and 11DCE were detected in well MW-115 at the highest concentrations for these constituents at the Site.

**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 7**

Because there is no known continuing sources it is expected that dissolved constituents in the groundwater will remain within an area defined to the north, south, and west that satisfies the definition of "existing area of contaminated groundwater" as provided in Footnote 2 below.

The thickness of the floating product observed in well MW-108, as described in Question 2, was recorded and purged from the well with a bailer so that only a sheen remained on top of the water column. Product thickness was recorded on August 28 at 0.5 feet, on September 3 at 0.1 feet, and as only a sheen on September 5, 2002. Floating product was not observed in downgradient well MW-111 nor in MW-109, located approximately 50 feet to the east in a side-gradient direction of MW-108. The observed floating product appears to be isolated in the vicinity of MW-108.

<sup>2</sup> "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 8**

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

- X   If yes - continue after identifying potentially affected surface water bodies.
- If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.
- If unknown - skip to #8 and enter "IN" status code.

**Rationale and Reference(s):**

There is little topographic relief SOUTH parcel of the Site between Huntingdon Avenue and East Aurora Street. The facility lies at approximately 300 feet above mean sea level (MSL). The depth to water at the Site is approximately 26 to 34 feet below grade, or approximately 270 feet MSL. The Site is located approximately 1,000 feet northwest of the Naugatuck River, which lies at approximately 260 feet above MSL. A groundwater contour map was generated for the Site (Drawing 2) that shows the groundwater flow to the southeast toward the Naugatuck River near the confluence with the Steele Brook. Based upon several factors, it is reasonable to conclude that groundwater beneath the Site ultimately discharges to the Naugatuck River. These factors include:

- groundwater at the Site is flowing in the direction of the Naugatuck River,
- the water surface elevation of the Naugatuck River is approximately 10 feet below the groundwater surface at the southeastern property line,
- there are no other surface water bodies in the vicinity of the Site.

It should be noted that for the production of Drawing 2, a surveyed benchmark was not available for the elevation survey performed on the monitoring wells at the Site. As such, the well elevations were based upon an arbitrary elevation of 1,000 feet.

As discussed in Question 3 above, metals (arsenic, copper, lead, and zinc) and VOCs (11DCE, 12DCA, PCE, and TCE) were detected above applicable criteria in wells that are near the southeastern boundary of the Site and are representative of groundwater that is flowing off-site. As such, it is presumed that the metals and VOC contamination in the groundwater discharges into the Naugatuck River.

**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 9**

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant**" (i.e., the maximum concentration<sup>3</sup> of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

\_\_\_\_\_ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration<sup>3</sup> of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

  **X**   If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration<sup>3</sup> of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations<sup>3</sup> greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

\_\_\_\_\_ If unknown - enter "IN" status code in #8.

**Rationale and Reference(s):**

Based upon an evaluation of available mapping, groundwater flow direction, surface water elevations, etc. it is reasonable to conclude that Site groundwater discharges into the Naugatuck River.

In order to determine the potential for exposure to surface water and sediment in the Naugatuck River from groundwater at the Site, alternative SWPC were calculated for arsenic, cadmium, copper, lead, mercury, zinc, 1,1-dichloroethylene, and 1,2-dichloroethane because the highest concentrations of these constituents detected on the Site exceed the respective tabulated SWPC for those constituents. The discussion of the alternative SWPC is presented in Question 6 below.

Only data from groundwater samples collected in 2002 were considered for this analysis, as it is representative of the current condition of groundwater beneath the Site. The highest concentrations of the constituents detected in the shallow wells and the respective tabulated SWPC are noted below:

Constituent	Highest Concentration Detected	Tabulated SWPC
Arsenic	0.029 mg/l	0.004 mg/l
Cadmium	0.0499 mg/l	0.006 mg/l
Copper	18.3 mg/l	0.048 mg/l
Lead	0.039 mg/l	0.013 mg/l
Mercury	0.0025 mg/l	0.0004 mg/l
Nickel	1.53 mg/l	0.88 mg/l
Silver	0.036 mg/l	0.012 mg/l
Zinc	2.90 mg/l	0.123 mg/l
1,1-dichloroethylene	160 µg/l	96 µg/l
Tetrachloroethylene	350 µg/l	88 µg/l

**Migration of Contaminated Groundwater Under Control  
Environmental Indicator (EI) RCRIS code (CA750)**

**Page 10**

The RSR require that for the SWPC to be achieved, the sampling locations must be representative of the groundwater contamination and either A) the average concentration of each substance must be equal to or less than the applicable SWPC for at least four consecutive quarterly sampling periods or B) the concentration of each substance which is immediately upgradient of the point at which the contamination discharges to the surface water body is equal to or less than the applicable SWPC, provided that the areal extent of contamination is not increasing over time and that the concentration of the substance of concern is not increasing at any point except as a result of natural attenuation.

In addition to the exceedances of the SWPC, concentrations of 1,1-dichloroethylene, 1,2-dichloroethane, tetrachloroethylene, and trichloroethylene were detected at concentrations that exceeded 10 times the MCL for these compounds in downgradient wells. These exceedances of the MCL are used to determine the exposure potential of dermal contact and ingestion for recreators and environmental samplers in the Naugatuck River and the Steele Brook.

Concentrations of 1,1-dichloroethylene and 1,2-dichloroethane exceeded both the RVC and the IVC in groundwater discharging into the Naugatuck River. The results of local well receptor survey has shown that there are no known active potable water supply wells in the immediate Site area that could be impacted by potential groundwater contamination emanating from the Site. Results of the survey are included in Attachment 4. Volatilization of contaminants in groundwater is unlikely because depth to groundwater measurements indicate groundwater is 26 feet below grade to 34 feet below grade as shown on the attached Table 5. The potential human pathway in this instance would involve volatilization of contaminants from impacted groundwater into the vadose zone, migration through the soil column into indoor air space and inhalation by the receptor.

Groundwater beneath the Site may not be suitable for direct human consumption due to waste discharges, spills or leaks of chemicals or other land use impacts and has been assigned a classification of "GB" by the DEP. The GB groundwater classification includes the Site and surrounding areas within 1.0 mile to the south, east and west. The southern portion of the MacDermid-owned parcel to the north is also classified GB. Based on information provided in the May 23, 2001 "*RCRA Corrective Action Stabilization Report*", and depth to groundwater data collected during July 2002, groundwater beneath the Site is ranges between 26 and 34 feet below grade.

<sup>3</sup> As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**

Page 11

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented<sup>4</sup>)?

  X   If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other Site-specific criteria (developed for the protection of the Site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment<sup>5</sup> appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or Site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

       If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

       If unknown - skip to 8 and enter "IN" status code.

**Rationale and Reference(s):**

Groundwater samples collected from on-site monitoring well identified several metals and VOCs that were detected at concentrations that exceeded the SWPC, 10 times the MCL, and the residential and industrial volatilization criteria. A determination of groundwater flow direction at the Site indicates that the contaminated groundwater beneath the Site discharges into the Naugatuck River and/or the Steele Brook.

In order to determine the potential concentration of contaminated groundwater migrating off site and discharging into the Naugatuck River, a Site-specific dilution attenuation factor (DAF) was calculated for arsenic, cadmium, copper, lead, mercury, zinc, 1,1-dichloroethylene, and 1,2-dichloroethane because the highest concentrations of these constituents detected on the Site exceed the respective tabulated SWPC and the RVC for those constituents.

Calculations of an Alternate SWPC were accomplished in accordance with the methodology provided in Section 22a-133k-3 (b)(3)(A) of the RSR. A value for the 7Q10 of the Lower Housatonic River Basin in the vicinity of the Site was determined by conservatively using published low-flow data for the Lower Naugatuck River Basin. The data used was collected from published United States Geological Survey data for the Lower Naugatuck River Basin, and the Connecticut DEP Water Resource Bulletin Number 34 (1982) for estimating the 7-day, 10-year low flow at a Site on the Naugatuck River. The reported 7Q10 for the Naugatuck River in the vicinity of the Site is 721,875 cubic feet/day. Twenty-five percent of the 7Q10 for the Naugatuck River at the Site is 180,469 cubic feet/day. The contamination was estimated conservatively to extend from between monitoring wells MW-113 and MW-104 as downgradient wells that did not have concentrations of metals or VOCs exceeding the applicable criteria. These wells are separated by a distance of approximately 725 feet. According to *The Bedrock Geology of the Waterbury Quadrangle*

## Migration of Contaminated Groundwater Under Control

Environmental Indicator (EI) RCRIS code (CA750)

Page 12

published in 1967 by the State Geological and Natural History Survey of Connecticut, the approximate depth to bedrock near the Site is 60 feet below grade, which would be the maximum depth of VOC contamination in the unconsolidated aquifer. As the depth to groundwater below the Site is approximately 30 feet, an estimated saturated thickness of contamination in groundwater below the site is 30 feet. The maximum cross sectional area (A) of contamination in groundwater at the Site is 21,750 square feet. The discharge area was calculated conservatively using the above dimensions, the average hydraulic conductivity (K) is based upon the composition of the soil, which in this case is a very fine to fine sand and has a K of approximately 15 feet/day. The average horizontal hydraulic gradient was calculated using the groundwater contours from the July sampling event and was calculated to be 0.019 feet/foot.

The discharge ( $K * \text{hydraulic gradient} * \text{cross-sectional area}$ ) for the Site was calculated to be 6,198.75 cubic feet/day.

The alternative dilution factor for the contaminants ( $(25\% * 7Q10)/\text{discharge area}$ ) was calculated to be 29.11.

The highest concentrations detected in monitoring wells on Site and the alternative SWPC for each constituent is presented in the table below.

Constituent	Highest Concentration Detected	Alternate SWPC
Arsenic	0.029 mg/l	0.11 mg/l
Cadmium	0.0499 mg/l	0.17 mg/l
Copper	18.3 mg/l	1.37 mg/l
Mercury	0.0025 mg/l	0.011 mg/l
Lead	0.039 mg/l	0.37 mg/l
Nickel	1.53 mg/l	25.12 mg/l
Silver	0.036 mg/l	0.34 mg/l
Zinc	2.90 mg/l	3.51 mg/l
1,1-dichloroethylene	160 µg/l	2,741 µg/l
Tetrachloroethylene	350 µg/l	2,512 µg/l

A comparison of the data to the alternate SWPC indicates that only copper was detected at concentrations that exceed the alternative SWPC. The concentration of copper that exceeded the alternative SWPC at the Site was detected in MW-110, which is located near the center of contamination and is upgradient of wells MW-111 and MW-114. Neither well MW-111 nor MW-114 had concentrations of copper that exceed the SWPC in 2002.

The Site is located within a highly industrialized area and there are likely several sources contributing to groundwater contamination in the vicinity of the Site. As such, a determination of impact directly from the MacDermid facility to the Naugatuck River or the Steele Brook is virtually impossible. However, in order to determine the contribution of the VOC contamination beneath the Site to the overall contamination within the Naugatuck River, the Site specific dilution attenuation factor was also applied to the VOC concentration data to be representative of the concentration of the groundwater as it enters the Naugatuck River.

Using the dilution attenuation factor of 29.11, the alternative concentrations for VOCs are well below the applicable criteria.

**Migration of Contaminated Groundwater Under Control  
Environmental Indicator (EI) RCRIS code (CA750)**

**Page 13**

Also, Steele Brook has been assigned a classification of "B" and the Naugatuck River a classification of "C/B" by the Connecticut Department of Environmental Protection (DEP). A designation of "B" indicates that water quality has been impacted by a combination of factors including combined sewer overflows, urban runoff, and inadequate industrial or municipal wastewater treatment. A classification of "C/B" indicates that the surface water body has been impacted by point or non-point sources of pollution and currently does not meet criteria to support one or more designated uses of a class "B" water body. The water quality goal is achievement of a class "B" designation and use which includes recreational use, fish and wildlife habitats, agricultural and industrial supply and navigation. Based upon the classification of these surface water bodies, any contaminant contribution from the VOC contamination to the Naugatuck River or the Steele Brook is not considered significant.

<sup>4</sup> Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

<sup>5</sup> The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.



**Migration of Contaminated Groundwater Under Control**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
**Page 14**

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

\_\_\_\_\_ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

  X\*   If no - enter "NO" status code in #8.

\_\_\_\_\_ If unknown - enter "IN" status code in #8.

Rationale and  
Reference(s):

\*Exceedances of the screening criteria (i.e. MCL, SWPC) were noted in groundwater. The evaluations presented in Question No. 5 above are appropriate in assessing the significance of human exposure to a surface water in consideration of the effects of groundwater discharges to the surface water. Based on these comparisons, it is determined that the concentrations observed in groundwater at the site represent *insignificant risks with respect to human exposure via surface water*. Because groundwater contamination at the Site does not pose a significant threat to human or ecological receptors and because the Site is located in an industrialized area with groundwater classified as GB, monitoring of the groundwater at the Site is not considered necessary. Consequently, it is concluded that migration of contaminated groundwater is under control, and Question No. 8 has been answered accordingly ("YE") to document this conclusion.

## Page 15

- X YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the MacDermid Incorporated facility, EPA ID # CTD001164599, located at 526 Huntingdon Avenue, Waterbury, Connecticut. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

IN - More information is needed to make a determination.

Supervisor (signature) \_\_\_\_\_ Date \_\_\_\_\_  
 (print)  
 (title)  
 (EPA Region or State)

\_\_\_\_\_

\_\_\_\_\_

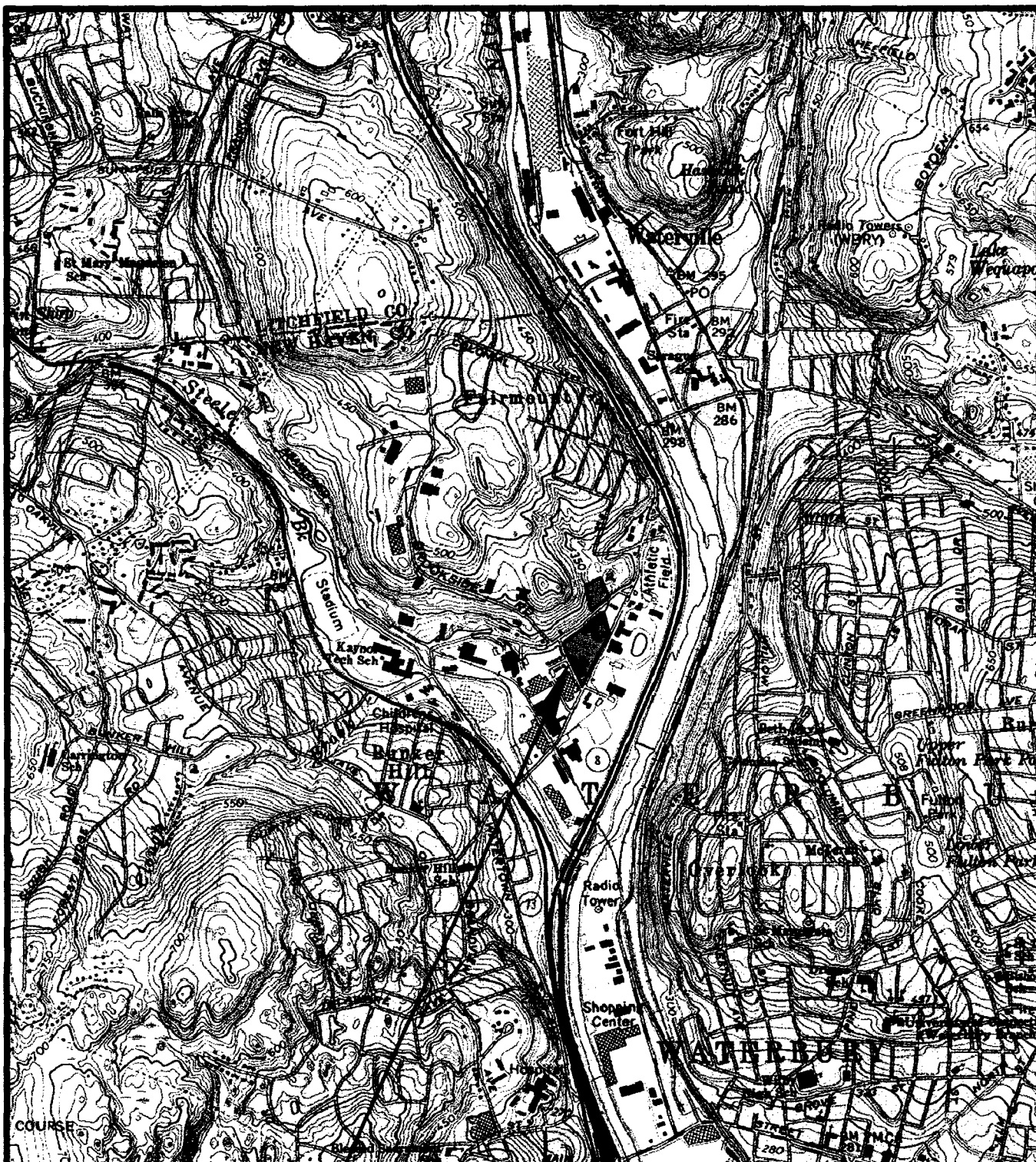
\_\_\_\_\_

\_\_\_\_\_

(name) \_\_\_\_\_  
(phone #) \_\_\_\_\_  
(e-mail) \_\_\_\_\_

**Attachment 1**

**Figures**



## SITE LOCATION

MAP REFERENCE:  
USGS 7.5 MINUTE SERIES QUADRANGLE  
WATERBURY, CONN. DATED 1968 AND  
REVISED 1994

1000 0 1000 2000 3000



SCALE IN FEET



MACDERMID, INC.  
526 HUNTINGDON AVENUE, WATERBURY, CT

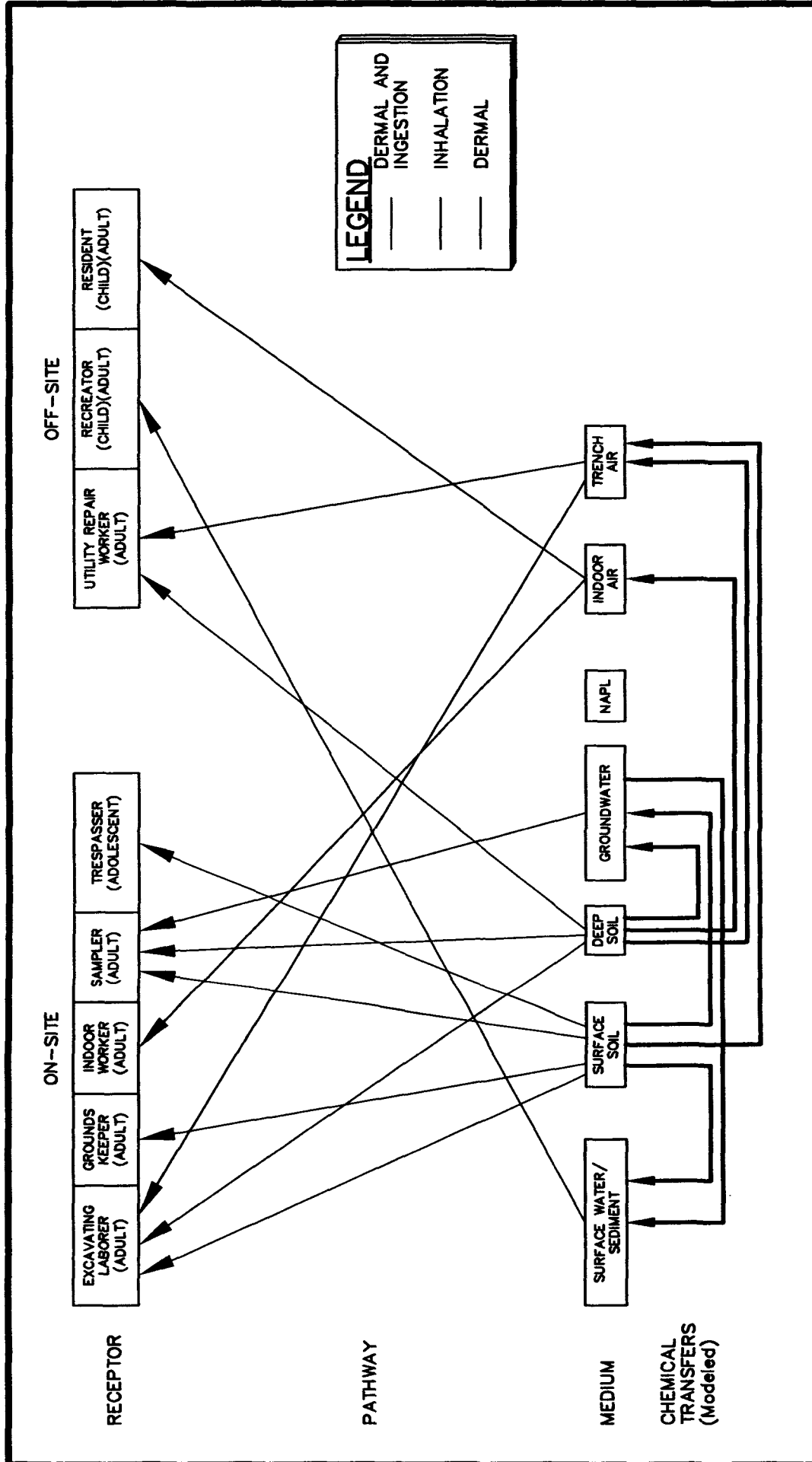
LOCATION MAP  
USGS TOPOGRAPHIC MAP

Comm.No.

91MH206

FIGURE 1





**LEGEND**

_____	DERMAL AND INGESTION
_____	INHALATION
_____	DERMAL

**Attachment 2**

**Drawings**

**US EPA New England  
RCRA Document Management System  
Image Target Sheet**

**RDMS Document ID #** 100198

**Facility Name:** MACDERMID INC

**Facility ID#:** CTD001164599

**Phase Classification:** R-13

**Purpose of Target Sheet:**

☒ **Oversized (in Site File)**      ☐ **Oversized (in Map Drawer)**

☐ **Page(s) Missing (Please Specify Below)**

☐ **Privileged**      ☐ **Other (Provide  
Purpose Below)**

**Description of Oversized Material, if applicable:**

**DRAWING 1: SUMMARY OF CONSTITUENTS  
DETECTED IN GROUNDWATER**

☒ **Map**      ☐ **Photograph**      ☐ **Other (Specify Below)**

**\* Please Contact the EPA New England RCRA Records Center to View This Document \***

**US EPA New England  
RCRA Document Management System  
Image Target Sheet**

**RDMS Document ID #** 100198

**Facility Name:** MACDERMID INC

**Facility ID#:** CTD001164599

**Phase Classification:** R-13

**Purpose of Target Sheet:**

☒ **Oversized (in Site File)**      ☐ **Oversized (in Map Drawer)**

☐ **Page(s) Missing (Please Specify Below)**

☐ **Privileged**                      ☐ **Other (Provide  
Purpose Below)**

**Description of Oversized Material, if applicable:**

**DRAWING 2: GROUNDWATER CONTOUR MAP**

☒ **Map**      ☐ **Photograph**      ☐ **Other (Specify Below)**

**\* Please Contact the EPA New England RCRA Records Center to View This Document \***



**Attachment 3**

**Tables**

**Table 1**  
**EXCEEDANCES OF SURFACE WATER PROTECTION CRITERIA FOR GROUNDWATER**  
**MacDermid inc. - Huntingdon Avenue, Waterbury, Connecticut**

[illegible]

Notes: 1. Only Exceedances Shown  
2. Printed on 10/24/02

**Table 1**  
**EXCEEDANCES OF SURFACE WATER PROTECTION CRITERIA FOR GROUNDWATER**  
**MacDermid inc. - Huntingdon Avenue, Waterbury, Connecticut**

Page 2 of 4

[illegible]

Notes: 1. Only Exceedances Shown  
2. Printed on 10/24/02

**Table 1**  
**EXCEEDANCES OF SURFACE WATER PROTECTION CRITERIA FOR GROUNDWATER**  
**MacDermid inc. - Huntingdon Avenue, Waterbury, Connecticut**

[illegible]

Notes: 1. Only Exceedances Shown  
2. Printed on 10/24/02

## Page 4 of 4

Notes: 1. Only Exceedances Shown  
2. Printed on 10/24/02

**Table 2**  
**EXCEEDANCES OF 10 TIMES THE EPA MAXIMUM CONTAMINANT LEVELS FOR GROUNDWATER**  
**MacDermid Inc.- Huntingdon Avenue, Waterbury, Connecticut**

Page 1 of 1

[illegible]

Notes: 1. Only Exceedances Shown

2. Printed on 10/24/02



**Table 4**  
**EXCEEDANCES OF THE INDUSTRIAL/COMMERCIAL VOLATILIZATION CRITERIA FOR GROUNDWATER**  
**MacDermid Inc.- Huntingdon Avenue, Waterbury, Connecticut**

[illegible]

Notes: 1. Only Exceedances Shown  
2. Printed on 10/24/02



<p>Table 5</p> <p>Groundwater Elevations</p> <p>MacDermid Incorporated, 526 Huntingdon Avenue, Waterbury, Connecticut</p> <p>September 5, 2002</p>				
Monitoring Well ID	Reference Elevation (Feet - NGVD <sup>a</sup> )	Measured Depth to Water, (9/5/02) (Feet)	Water Level Elevation (9/5/02) (Feet - NGVD <sup>a</sup> )	Well Depth (9/5/02) (Feet) <sup>b</sup>
MW-101 (MAC-6)	1016.67	2.94	1013.73	32.64
MW-102 (MAC-5)	1014.00	26.08	987.92	33.57
MW-103 (GZ-2)	994.96	31.20	963.76	34.71
MW-104 (MAC-7)	993.12	Obstructed	NM	19.74
MW-105 (GZ-7)	995.53	32.51	963.02	36.70
MW-106 (MAC-4)	Destroyed	NM	NM	NM
MW-107 (MAC-3)	Destroyed	NM	NM	NM
MW-108 (GZ-9)	996.11	NM	NM	PRODUCT
MW-109 (GZ-8)	996.12	32.87	963.25	34.41
MW-110 (MAC-1)	996.32	33.29	963.03	39.41
MW-111 (GZ-6)	994.13	31.82	962.31	34.72
MW-112 (GZ-3)	994.87	32.22	962.65	34.75
MW-113 (GZ-5)	996.26	34.36	961.90	39.86
MW-114	994.24	31.91	962.33	37.63
MW-115	994.86	32.25	962.61	37.71

<sup>a</sup> NGVD - National Geodetic Vertical Datum of 1929.

<sup>b</sup> Depths in feet below ground surface.